



National Renewable Energy Laboratory
Innovation for Our Energy Future

Trends in Renewable Energy Development and Policy



**Technical Assistance
Program Webcast**

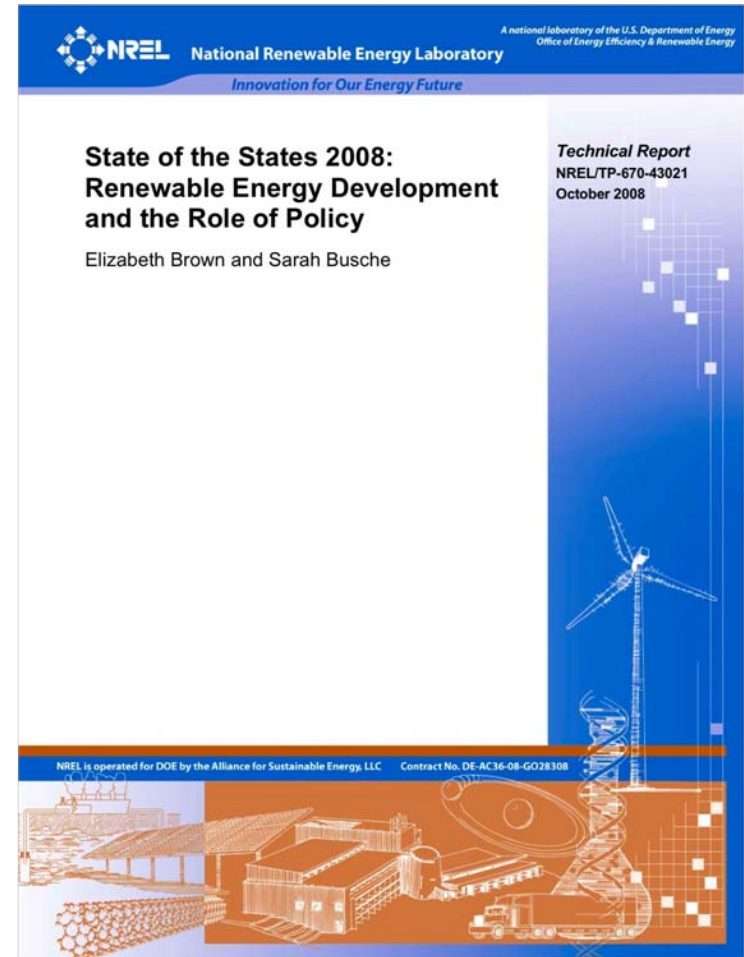
Elizabeth Doris

February 18, 2009

State of the States 2008

- DOE-WIP Funded
- Goal: determine which state policies have impact on renewable energy development

- 1) First year: general overview and correlation
- 2) This year: specific **resource** related policies
- 3) Next Year (this year?!): specific regions

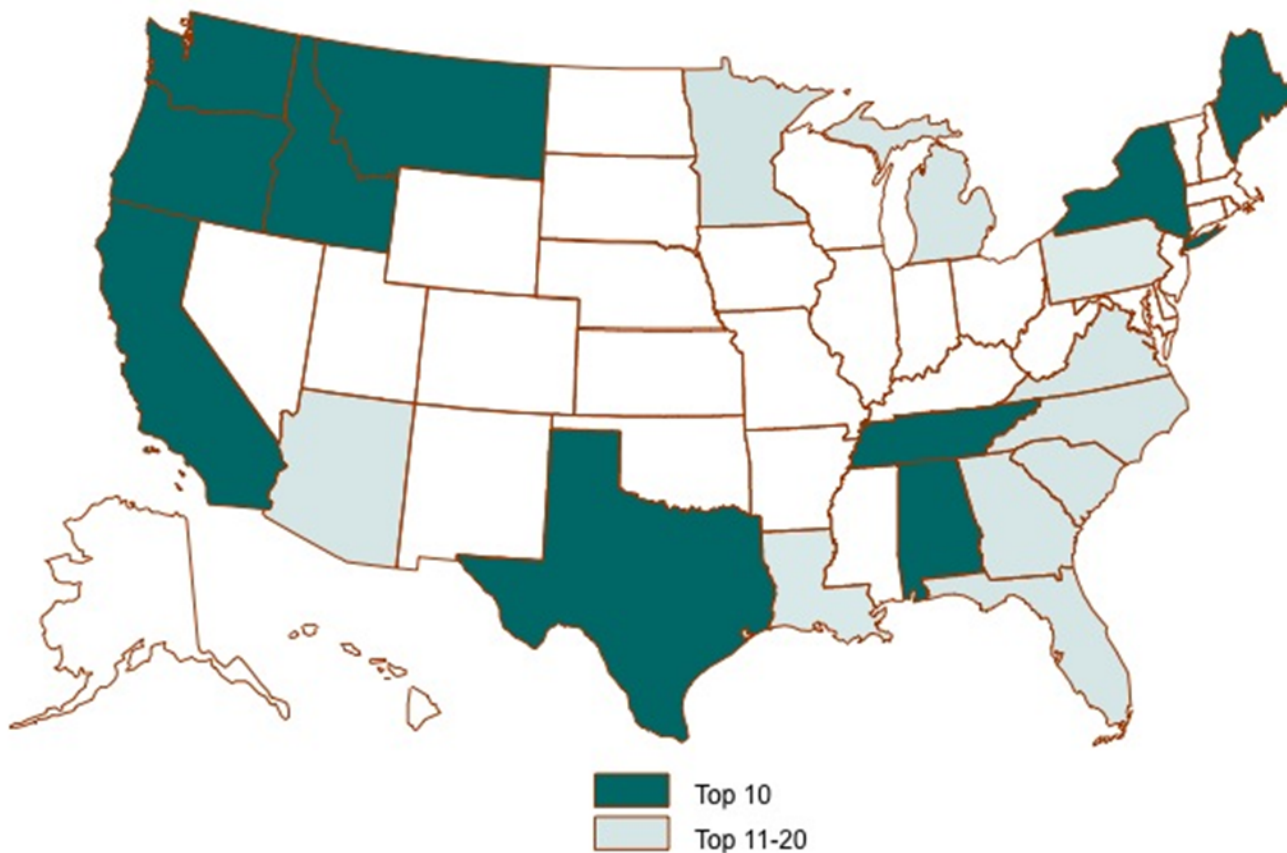


Also available: Technical Policy Assistance through TAP Program:
<http://apps1.eere.energy.gov/wip/tap.cfm>

RENEWABLE ENERGY TRENDS 2008

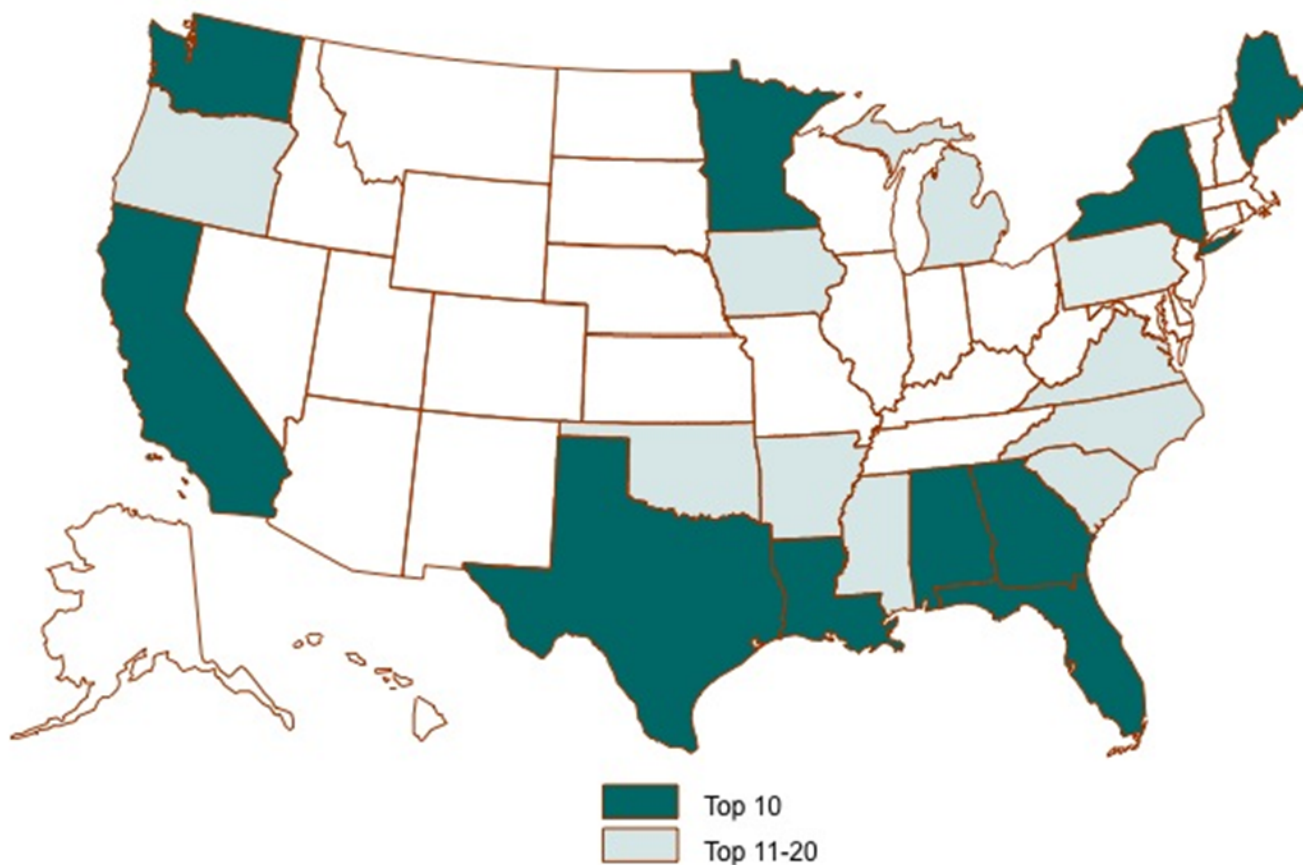
ROLE OF STATE POLICY

Total On-Grid Renewable Energy Generation 2006



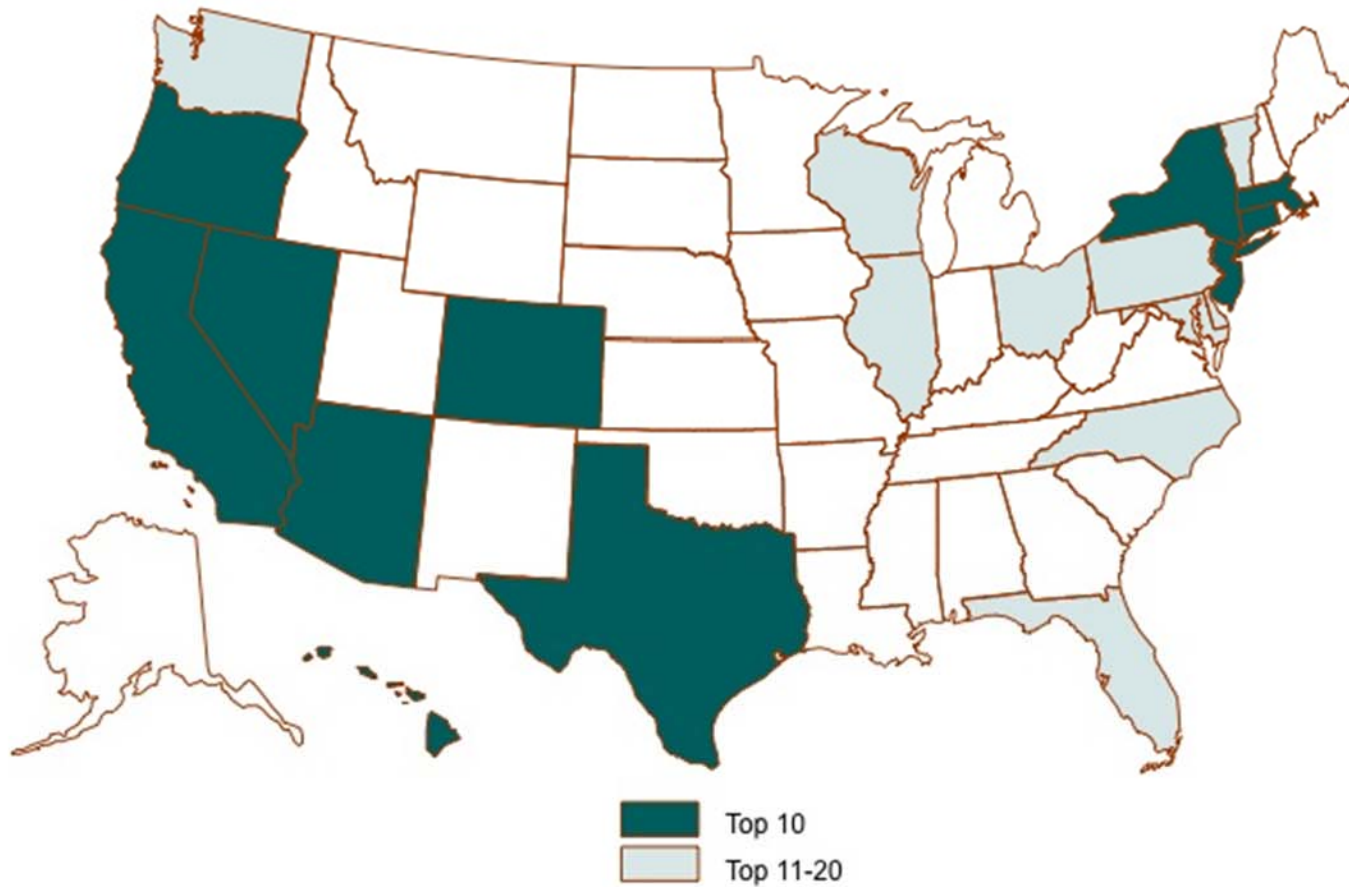
Source: Data from Brown and Busche 2008

Total Non-Hydro Renewable Energy Generation 2006



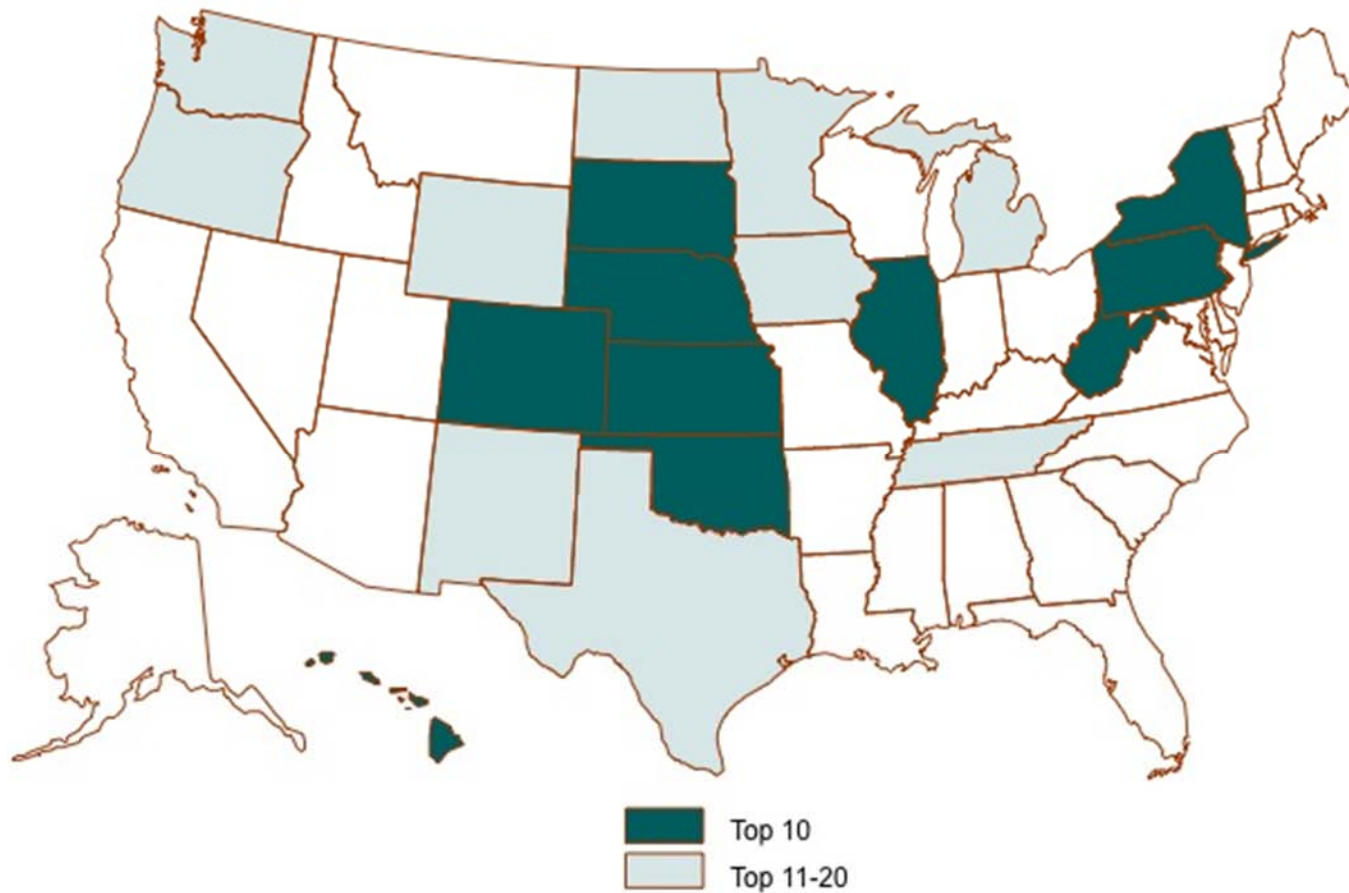
Source: Data from Brown and Busche 2008

Distributed PV - 2007



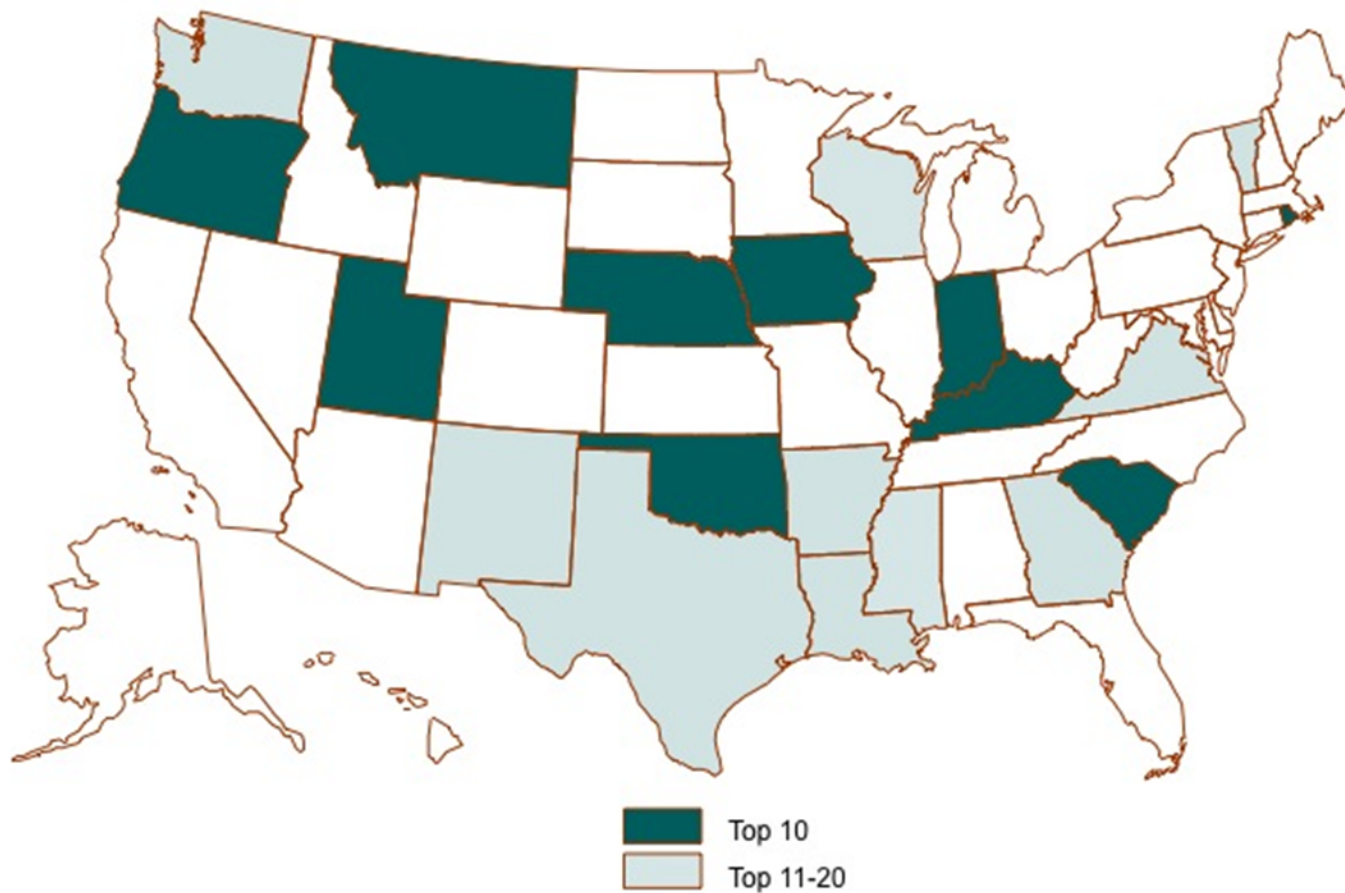
Source: Data from Sherwood 2008, Brown and Busche 2008

Most Improved Wind Generation 2001-2006



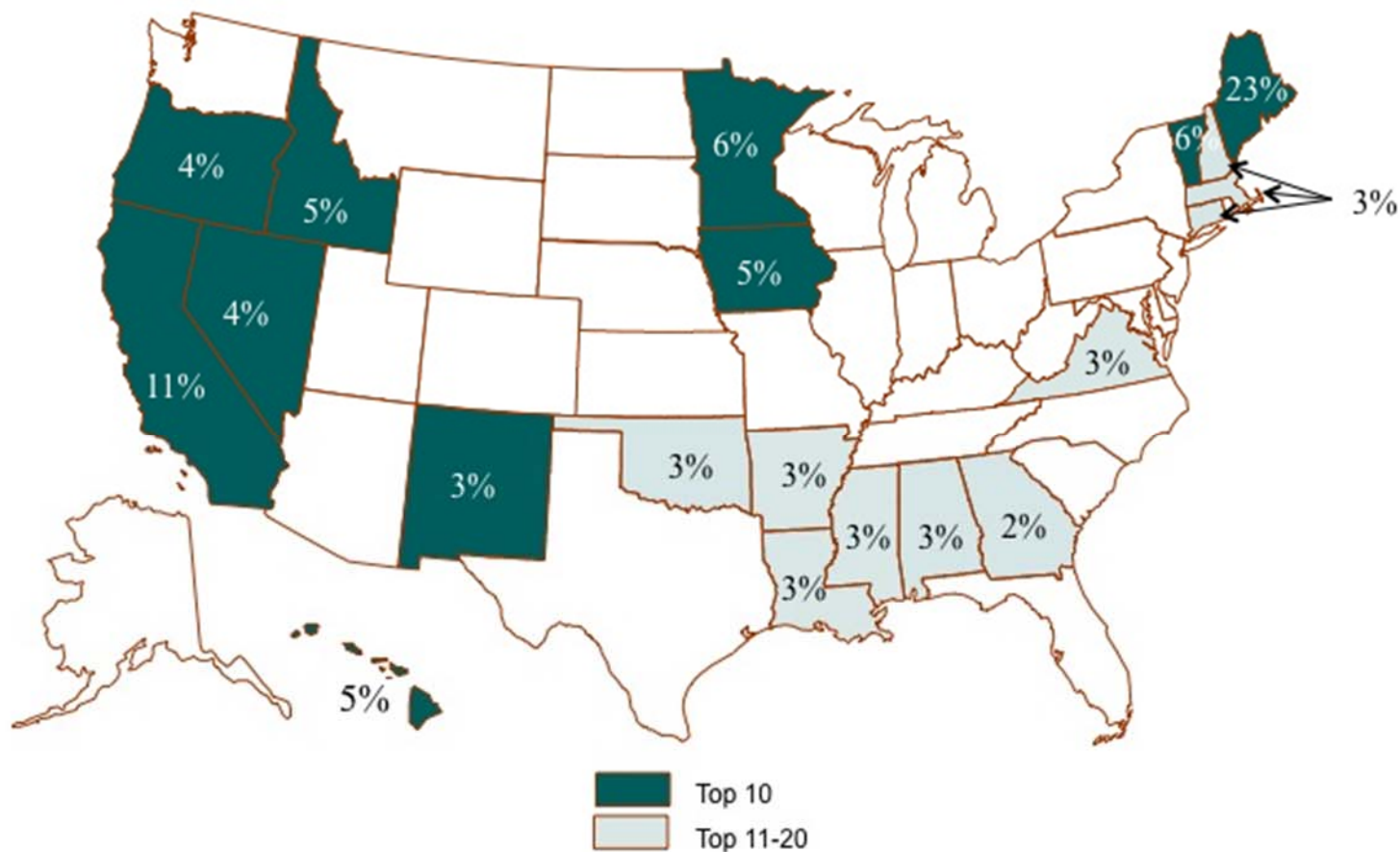
Source: Brown and Busche 2008

Most Improved: Biomass Generation 2001-2006



Source: Data from Brown and Busche 2008

Percentage of Total State Electricity Generation: Non-hydro Renewable Resources (2006)



Source: Data from Brown and Busche 2008

Renewable Energy Trends Summary

According to EIA data, between 2001 and 2006,

- 24 states increased electricity generation from biomass resources,
- 23 states from wind electricity production,
- 4 states from geothermal electricity production, and
- 2 states from large-scale solar electricity production

Renewable Electricity Trends Overview

- Hydroelectric generation provided the largest proportion, but shrinking.
- Between 2001 and 2006, wind resource presents the largest growth
- Growth in electricity from biomass is primarily occurring in the southeast
- **Renewable energy growth was generally outstripped by economic growth as measured by gross state product (GSP) and population growth.**

RENEWABLE ENERGY TRENDS 2008

ROLE OF STATE POLICY

The Role of Policy: Theory

- Removing Institutional Barriers
- Informing
- Developing Technologies
- Creating and Facilitating Markets
- Levelizing Cost

Types of Policies in Market Transformation Model

Market Preparation

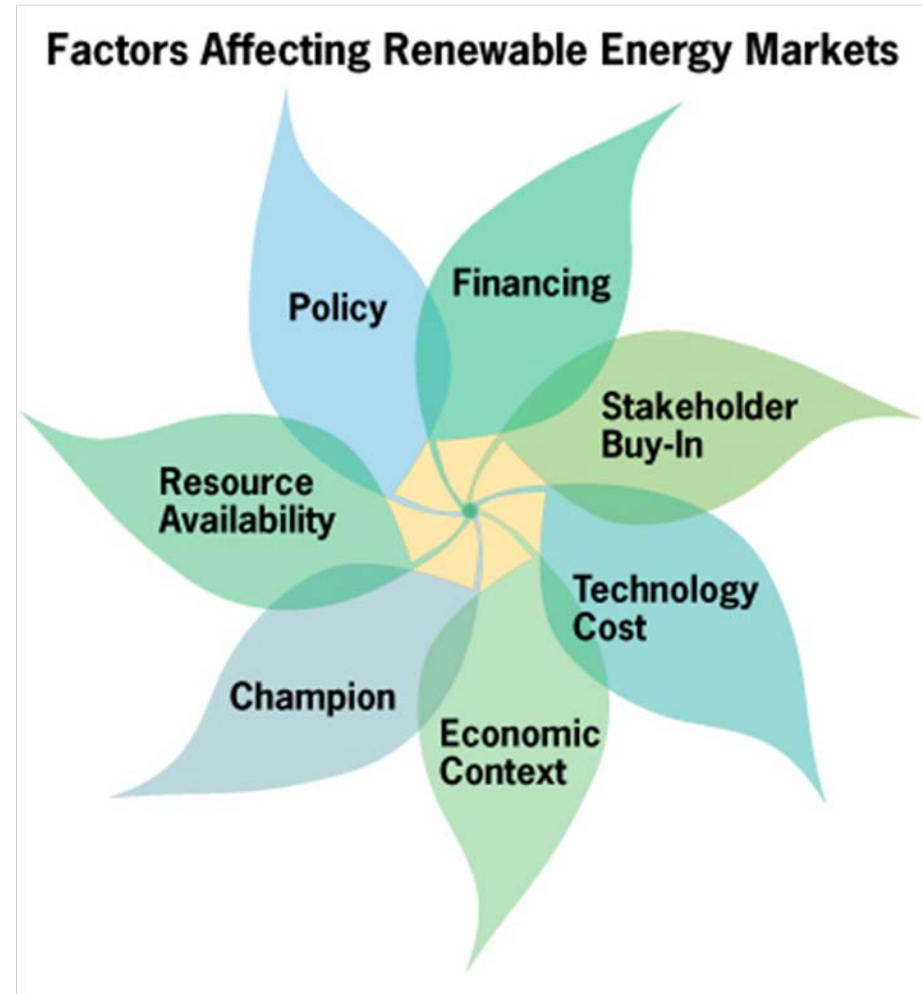
- Contractor Licensing
- Equipment Certification
- Generation Disclosure
- Interconnection
- Land Access
- Line Extension Analysis
- Net Metering
- Public Benefit Fund with RE
- Renewable Portfolio Standards
- (Feed in Tariff)

Technology Accessibility

- Corporate Tax Incentives
- Grants
- Loans
- Personal Tax Incentives
- Property Tax Incentives
- Rebates
- Renewable Energy Production Incentives
- Sales Tax Incentives

Factors Affecting Renewable Energy Development

- Drivers for RE development vary by scope and context
- You need a perfect storm of factors

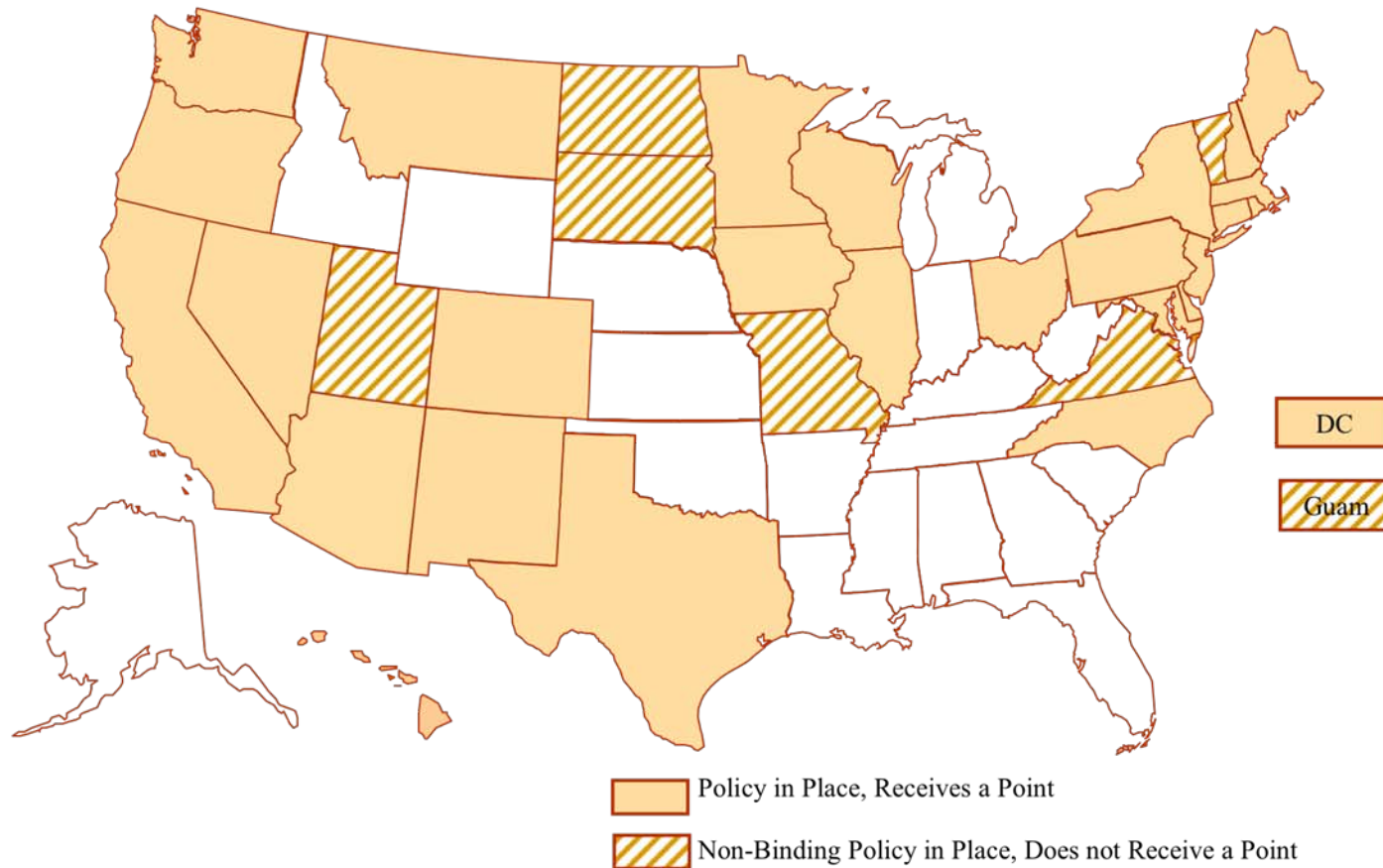


From Theory to Practice

Steps:

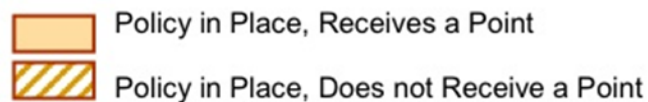
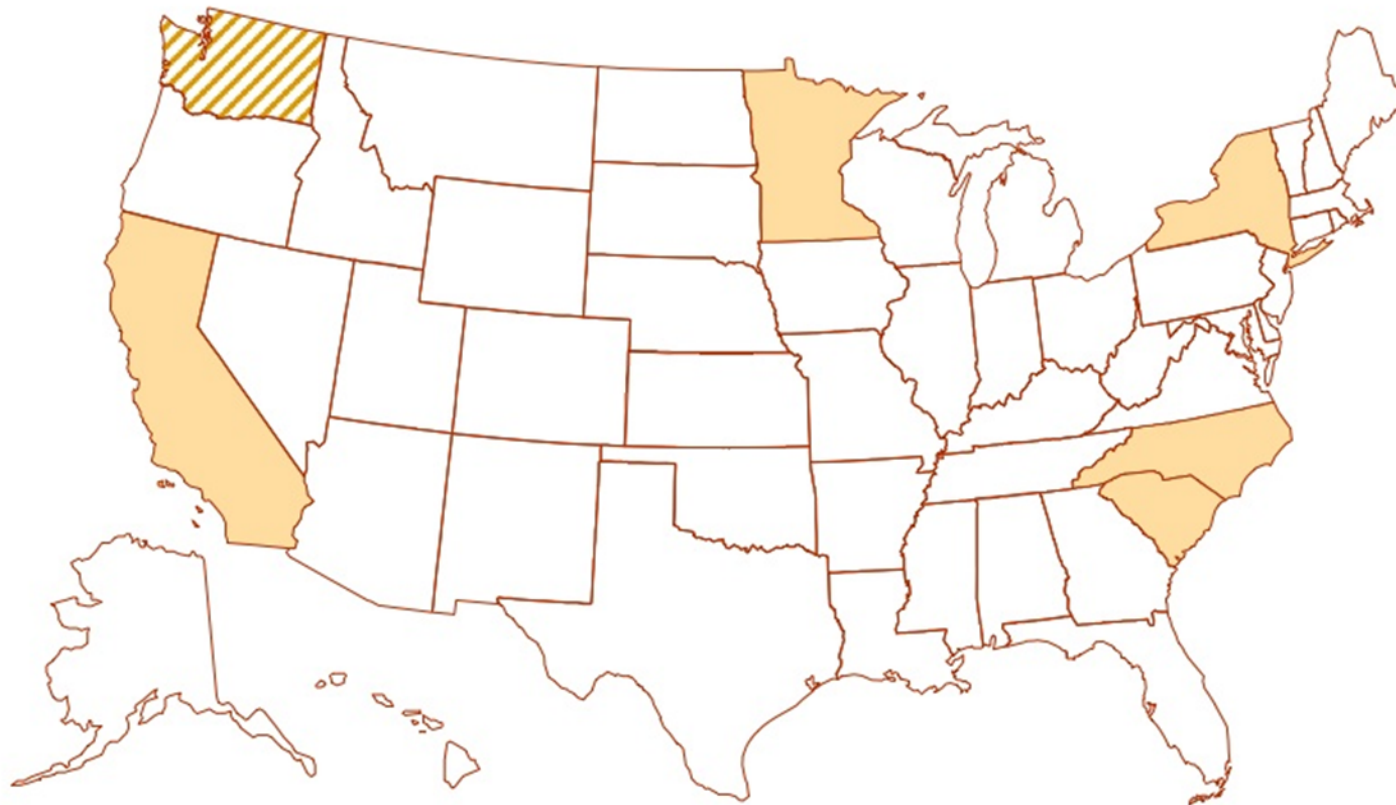
- 1) Compile trends data
 - 2) Determine which states have which (best practice) policies
-
- 1) DRAW CONCLUSIONS ABOUT EFFECTIVENESS OF POLICY

State RPS Policies



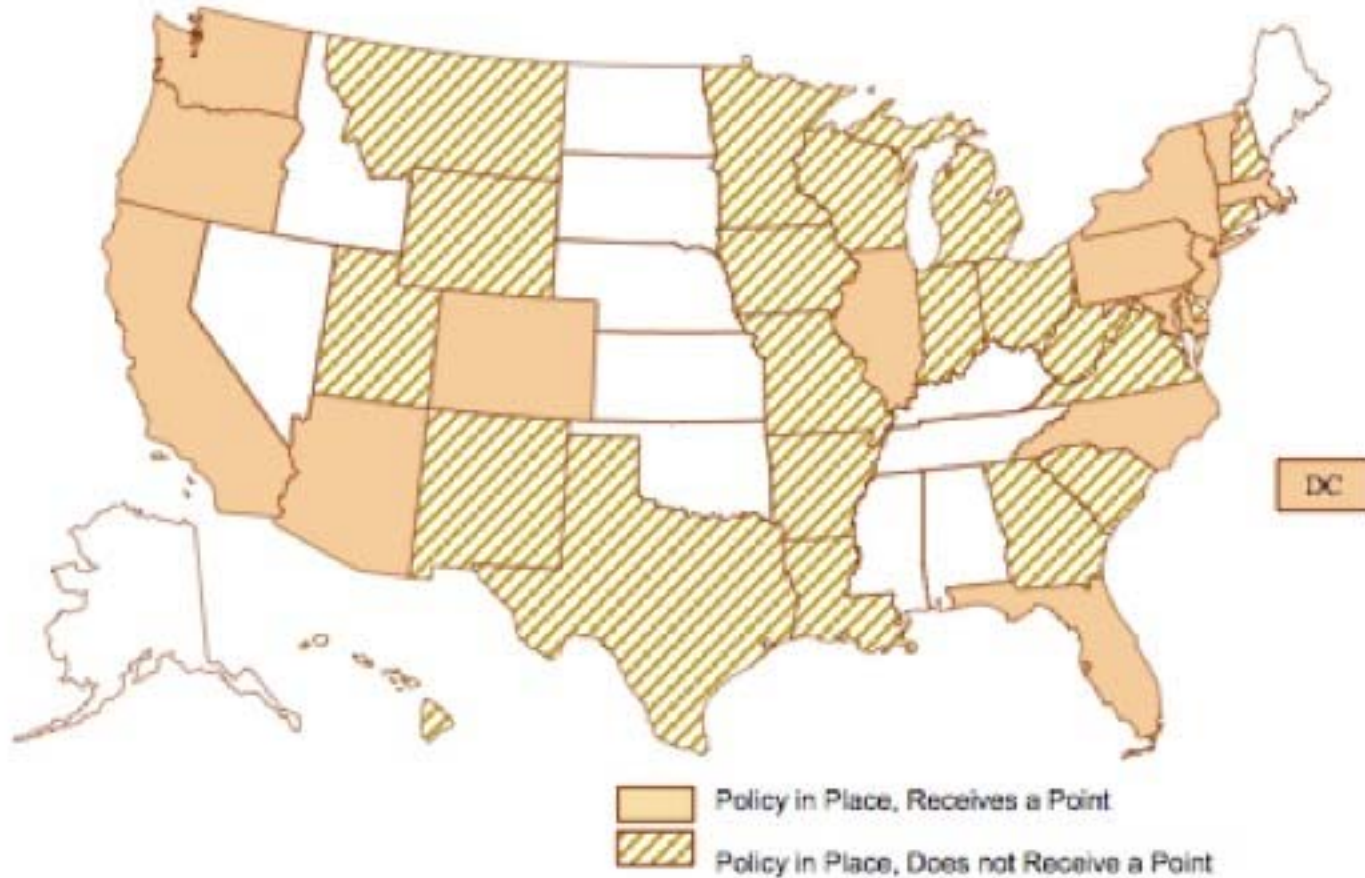
Source: National Renewable Energy Laboratory, July 2008

State Production Tax Incentives



Source: National Renewable Energy Laboratory, July 2008

Net Metering – Best Practices



Source: National Renewable Energy Laboratory, July 2008

Policies in the Southeastern US

	Market Preparation Policies											Technology Accessibility Policies							Sum Market Preparation	Sum Technology Access.
State	Contractor Licencing	Equipment Certification	Generation Disclosure	Interconnection	Land Access	Line Extension Analysis	Netmetering	PBF w/ RE	RPS	Vol.&Man. Green Power	Corp. Tax Incentives	Grants	Loans	Pers. Tax Incenctives	Property Tax Incentives	Rebates	RE Prod. Incentives	Sales Tax Incentives		
AL										•		•		•					1	3
AR							•			•									2	0
D.C.				•					•			•							2	1
DE							•	•	•	•		•				•		NA	4	3
FL	•	•		•	•		•			•	•	•		NA		•		•	6	5
GA					•					•	•			•				•	2	3
KY					•		•			•	•			•				•	3	3
LA							•			•	•		•	•	•				2	4
MD			•	•	•		•		•		•		•	•	•	•		•	5	6
MS										•			•						1	1
MO					•		•			•	•		•						3	2
NC				•	•				•	•	•		•	•	•		•		4	5
SC										•	•	•	•	•		•	•	•	1	7
TN					•					•		•	•	NA	•				2	4
TX						•			•	•	•		•	NA	•				3	4
VA					•		•												2	0
WV										•									1	0

The Role of Policy: Practice

- **RPS:**
 - higher wind-based electricity generation.
 - higher renewable percentages of overall electricity generation
- **Production incentives** with higher renewable electric capacity and generation
- **Interconnection policies** meeting best practices with
 - increased renewable energy capacity and generation overall, and
 - **individually with higher biomass, hydroelectric, and PV capacity.**

Market Transformation Correlation Findings

- States with barrier-reduction policies correlate with development (as measured by generation, generation per capita, and generation per GSP).
- States with higher proportion of incentive policies not correlated with increased development
- States with high proportion of both correlated with development, so:

Correlation between barrier reduction policies and generation, indicating that incentive policies do not increase development in the absence of barrier-reduction policies.

Next Steps

- Time sensitive analysis: policy length
- Policy design practice analysis: policy strength
- Context Factors: What contributes to policy success, and how can you design around and within it?
- Regional activities: role of regional and federal policy interactions

Questions Now?

Questions Later?

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What Policy Works for Your Priorities?

Environmental Policy Priorities

Policies Reviewed by SCEPA	Clean air benefits (SOX, NOX, Mercury, Particulates)	GHG emissions reductions	Reduce water consumption	Reduce water pollution (heat and mercury)	Reduced fuel extraction impacts	Preserve sensitive areas	Protect wildlife/endangered species	Minimize human impacts
RPS	High	High	High	High	High	High	Moderate/High	High
RFS	Limited/Moderate	Limited/Moderate	Limited/Moderate	Limited/Moderate	Limited/Moderate	Limited/Moderate	Limited/Moderate	Limited/Moderate
Rebate	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited
FIT	High	High	High	High	High	High	High	High

Economic Development Priorities

	Job creation	State economic development	Minimize energy costs	Minimize Consumer impacts	Energy price stability	Revitalize rural areas	Attract new investment	Develop local or community-owned assets
RPS	Moderate/High	Moderate/High	Moderate	Moderate	Moderate	Moderate	moderate	Limited
RFS	Moderate	Moderate	Moderate	Moderate	Moderate	High	moderate	moderate
Rebates	Limited	Limited	Limited	Limited	Limited	Limited	moderate	Limited
FIT	High	High	Moderate	Moderate	Moderate	High	High	High

Energy Security Priorities

	Abundant energy supply	Affordable energy supply	Reduce transfer of wealth outside the U.S.	Become a net exporter of energy	Diversify energy resources	Peak Demand Reduction	Resilient Grid System	Encourage distributed energy generation
RPS	Moderate	Moderate	Limited	Limited	High	Moderate	Limited	Limited
RFS	Moderate	Moderate	High	Moderate	High	n/a	n/a	n/a
Rebates	Limited	Limited	Limited	Limited	Moderate	Moderate	Moderate	High
FIT	Moderate	Moderate	Limited	Moderate	High	Moderate	Limited	Moderate

State Clean Energy Policy Project: http://www.nrel.gov/applying_technologies/scepa.html